Project Introduction

Intelligent Automation, Inc. and its sub-contractor, Purdue University, propose to develop a power-efficient miniaturized reconfigurable EVA radio system with built-in 3D navigation capability. It uses the state-of-the-art RF MEMS and software defined radio (SDR) technologies to achieve extreme miniaturization, power saving, and reconfigurability. Its 3D navigation function is based on proven pseudo Doppler and monopulse direction finding techniques. The wireless communications and navigation functions share the same S-band signal (2.4~2.483 GHz) and can operate up to 10km with position accuracy of 300 meters (3 sigma). The radio is designed to work with a mobile ad hoc network so the coverage for communications can be increased indefinitely by adding more nodes. This radio system can be used for transmitting voice, telemetry, and video among fixed and mobile asset, including lunar/Mars base stations, landers, habitats, rovers, and astronauts. Modern FPGA devices are bridging the gap between high speed digital design and DSP implementation. The SDR based architecture allows the radio to support multiple bandwidth, waveforms, and energy profiles, even those developed after the mission began, via cognitive middleware. The MEMS tunable filters proposed is based on miniaturized evanescent mode cavities, which are 95% smaller than conventional cavities and are capable of providing very high Q and excellent tuning range.

Primary U.S. Work Locations and Key Partners

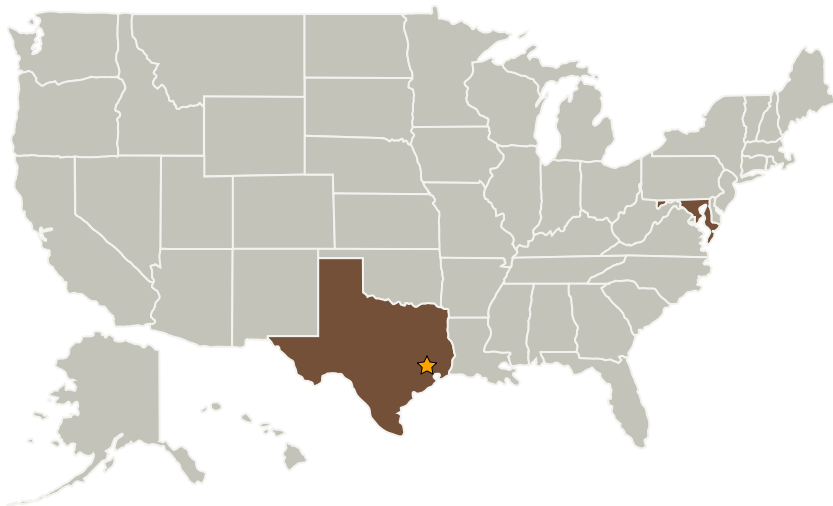Reconfigurable EVA Radio with Built-In Navigation Capability, Phase I

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Organizations Performing Work	Role	Type	Location
⭐Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Intelligent Automation, Inc.	Supporting Organization	Industry	Rockville, Maryland

Primary U.S. Work Locations	
Maryland	Texas

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX04 Robotic Systems
  └ TX04.1 Sensing and Perception
    └ TX04.1.2 State Estimation